FIG. 1

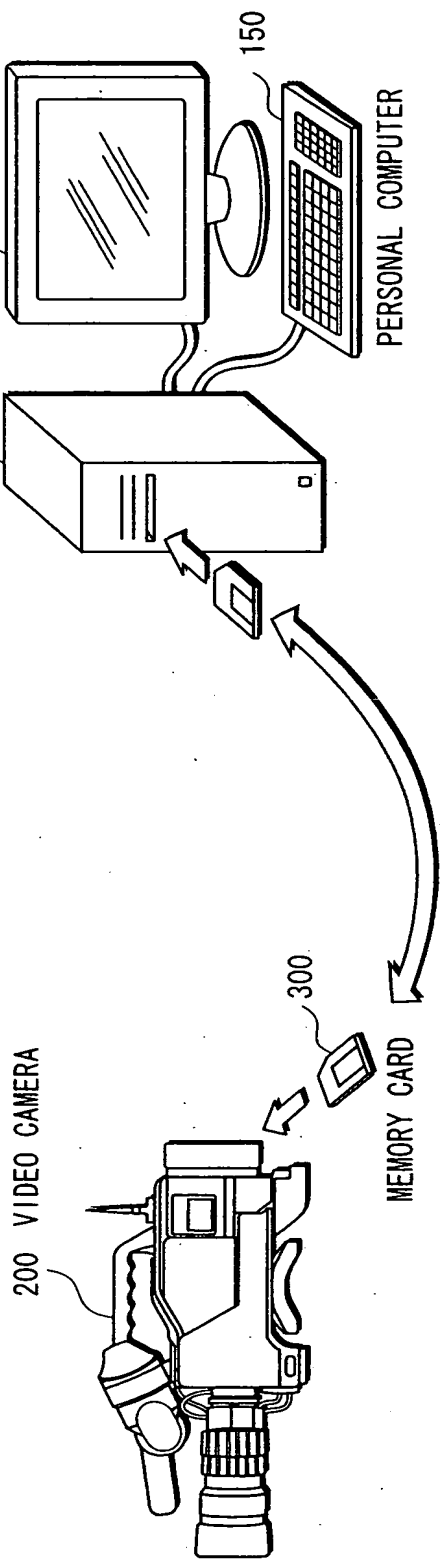

140 DISPLAY
150
PERSONAL COMPUTER
100
300
MEMORY CARD
200 VIDEO CAMERA

FIG. 2

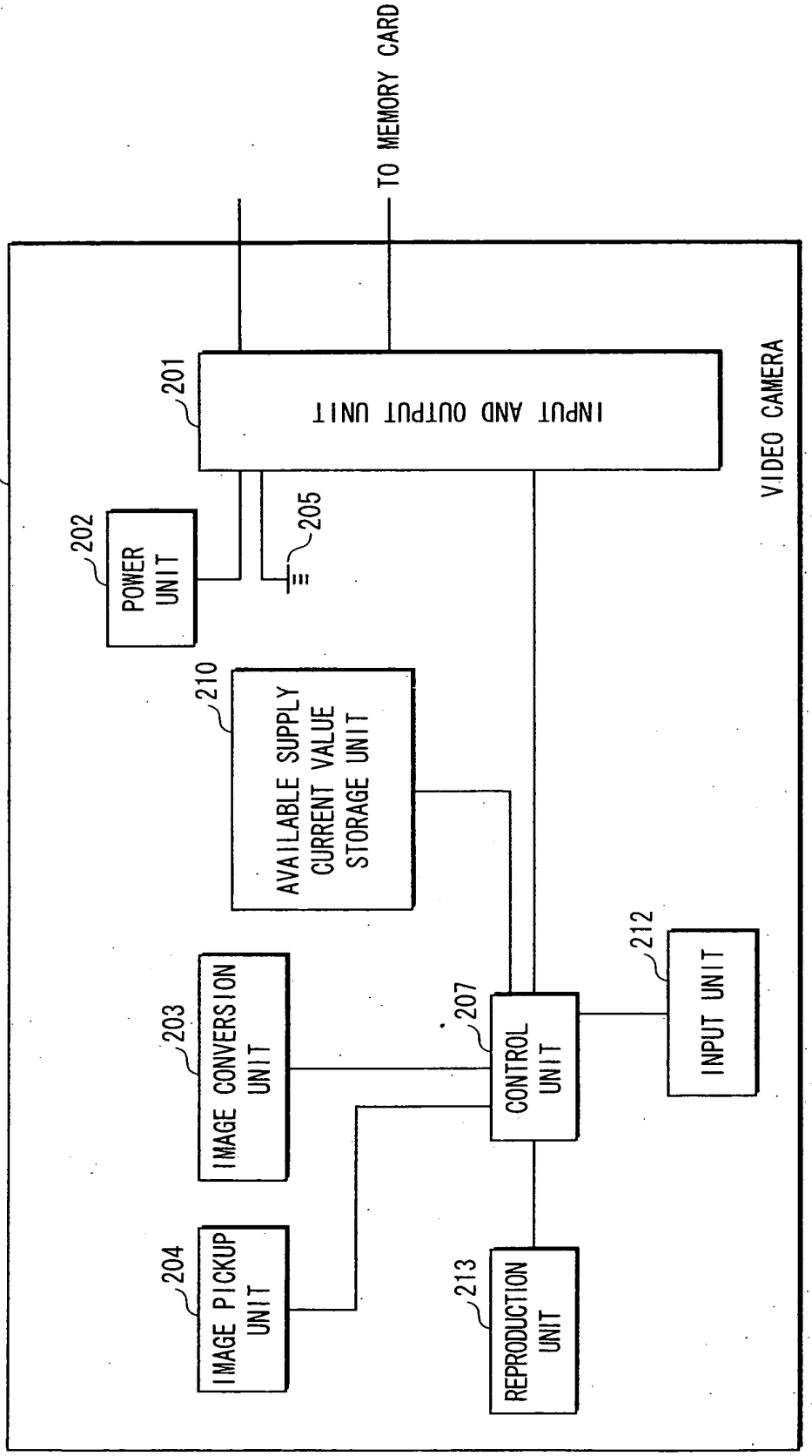

TO MEMORY CARD
200
VIDEO CAMERA
201
INPUT AND OUTPUT UNIT
202
POWER UNIT
205
210
AVAILABLE SUPPLY CURRENT VALUE STORAGE UNIT
203
IMAGE CONVERSION UNIT
207
CONTROL UNIT
212
INPUT UNIT
204
IMAGE PICKUP UNIT
213
REPRODUCTION UNIT

FIG. 3

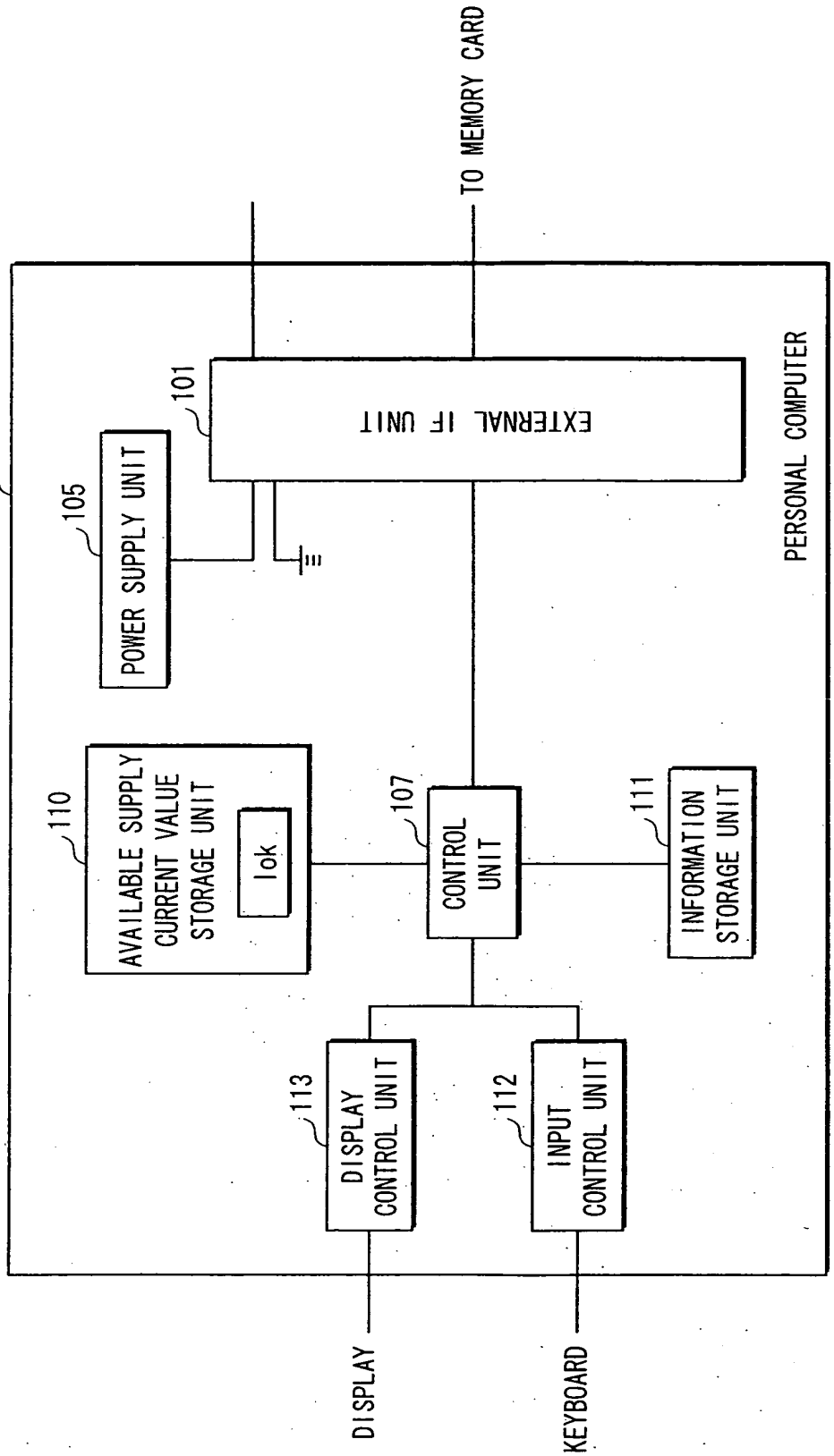

100
TO MEMORY CARD
101
EXTERNAL IF UNIT
PERSONAL COMPUTER
105
POWER SUPPLY UNIT
110
AVAILABLE SUPPLY CURRENT VALUE STORAGE UNIT
Iok
107
CONTROL UNIT
111
INFORMATION STORAGE UNIT
113
DISPLAY CONTROL UNIT
112
INPUT CONTROL UNIT
DISPLAY
KEYBOARD

FIG. 4

340

		7	6	5	4	3	2	1	0
341	Features	Sub command "05h"							
342	Sector Count	Advanced power management level							
343	Sector Number	na							
344	Cylinder Low	na							
345	Cylinder High	na							
346	Device/Head	na	na	na	DRV (0)	na			
347	Command	Command "FEh"							

FIG. 5

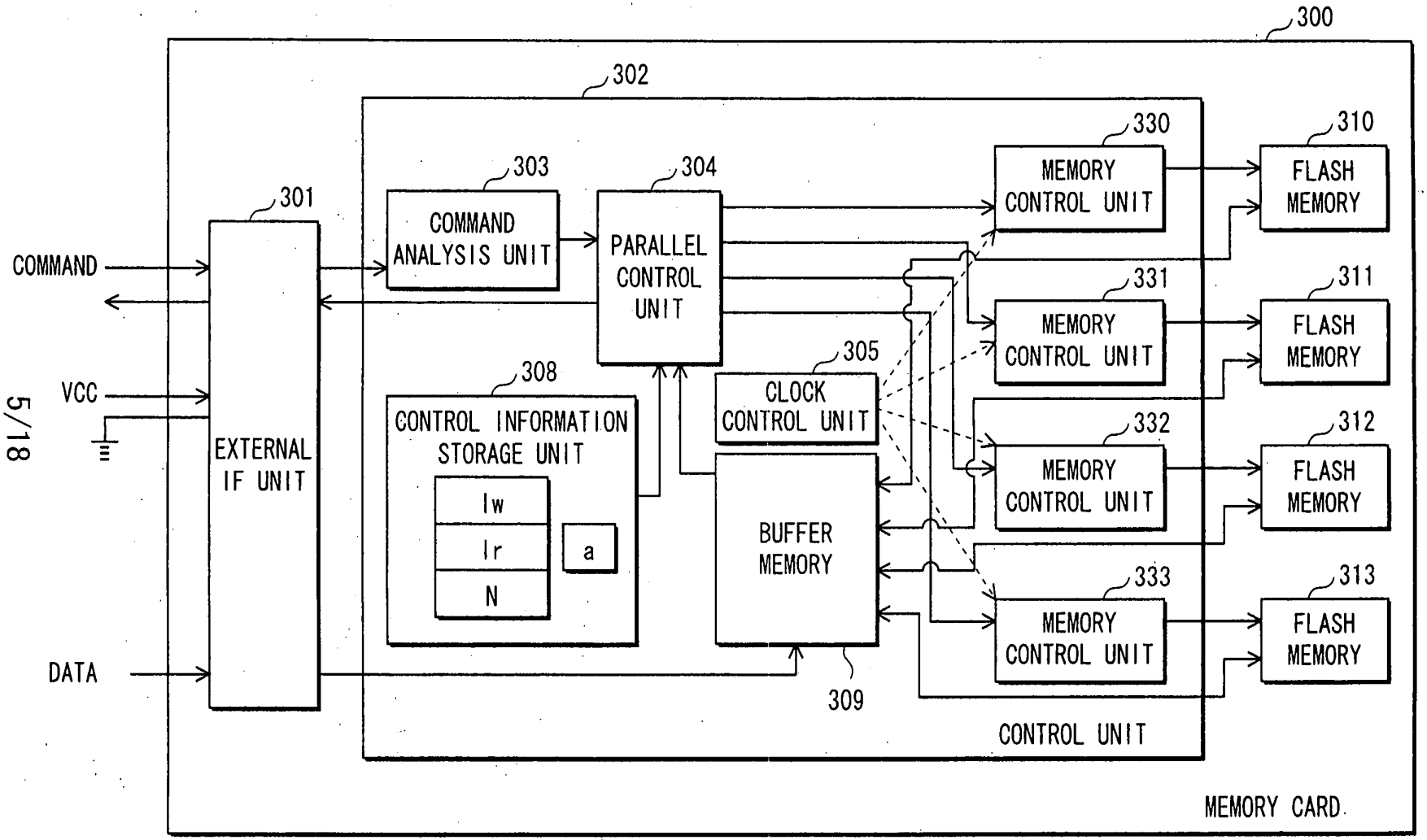

300
302
301
303
304
330
310
COMMAND
COMMAND ANALYSIS UNIT
PARALLEL CONTROL UNIT
MEMORY CONTROL UNIT
FLASH MEMORY
331
311
MEMORY CONTROL UNIT
FLASH MEMORY
VCC
308
305
CONTROL INFORMATION STORAGE UNIT
CLOCK CONTROL UNIT
EXTERNAL IF UNIT
Iw
Ir
N
a
BUFFER MEMORY
332
312
MEMORY CONTROL UNIT
FLASH MEMORY
333
313
DATA
MEMORY CONTROL UNIT
FLASH MEMORY
309
CONTROL UNIT
MEMORY CARD

FIG. 6

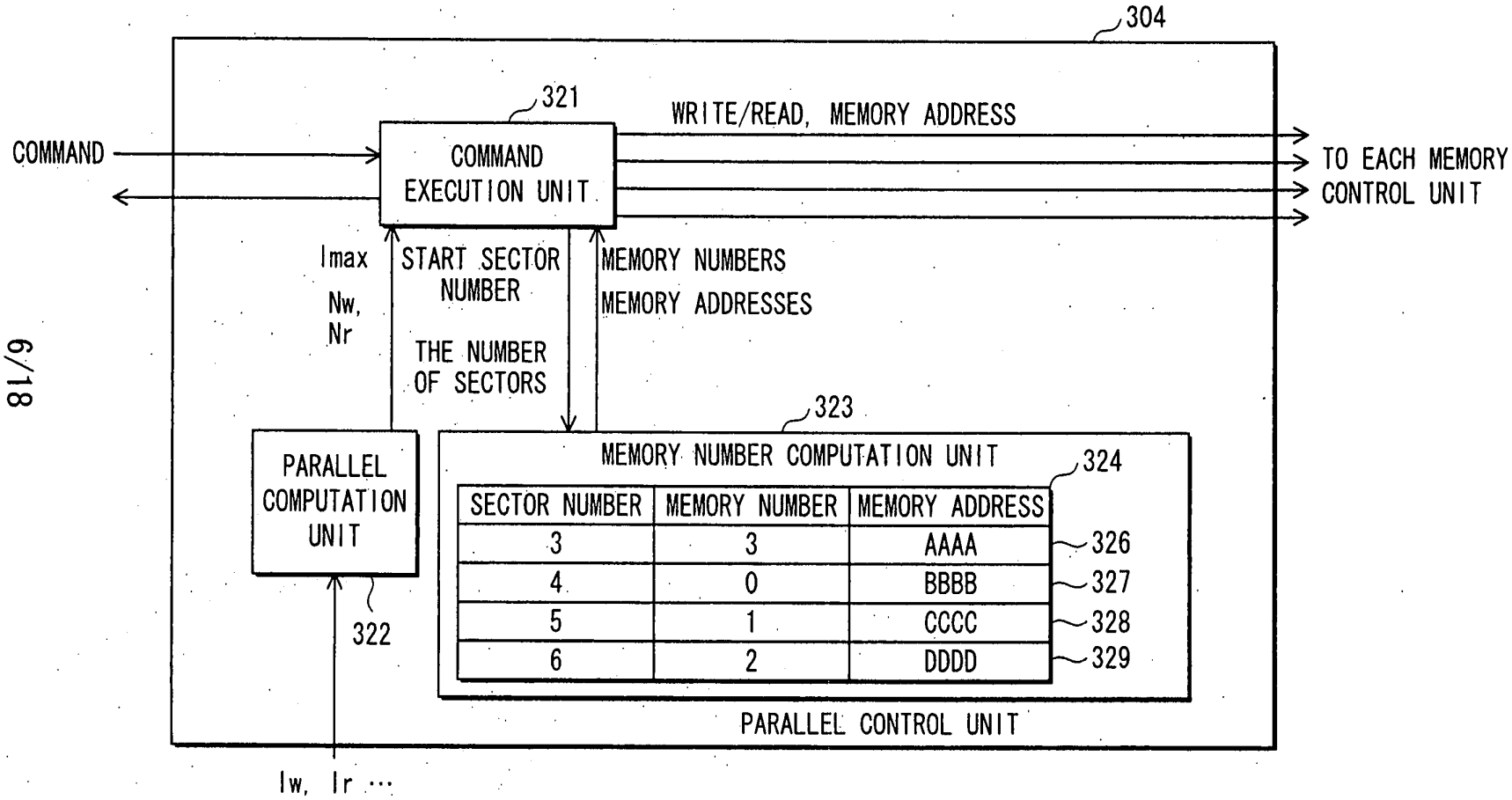

304
321
COMMAND
COMMAND EXECUTION UNIT
WRITE/READ, MEMORY ADDRESS
TO EACH MEMORY CONTROL UNIT
Imax
Nw, Nr
START SECTOR NUMBER
THE NUMBER OF SECTORS
MEMORY NUMBERS
MEMORY ADDRESSES
323
MEMORY NUMBER COMPUTATION UNIT
324
PARALLEL COMPUTATION UNIT
SECTOR NUMBER | MEMORY NUMBER | MEMORY ADDRESS
3 | 3 | AAAA
4 | 0 | BBBB
5 | 1 | CCCC
6 | 2 | DDDD
326
327
328
329
322
PARALLEL CONTROL UNIT
Iw, Ir ···

FIG. 7

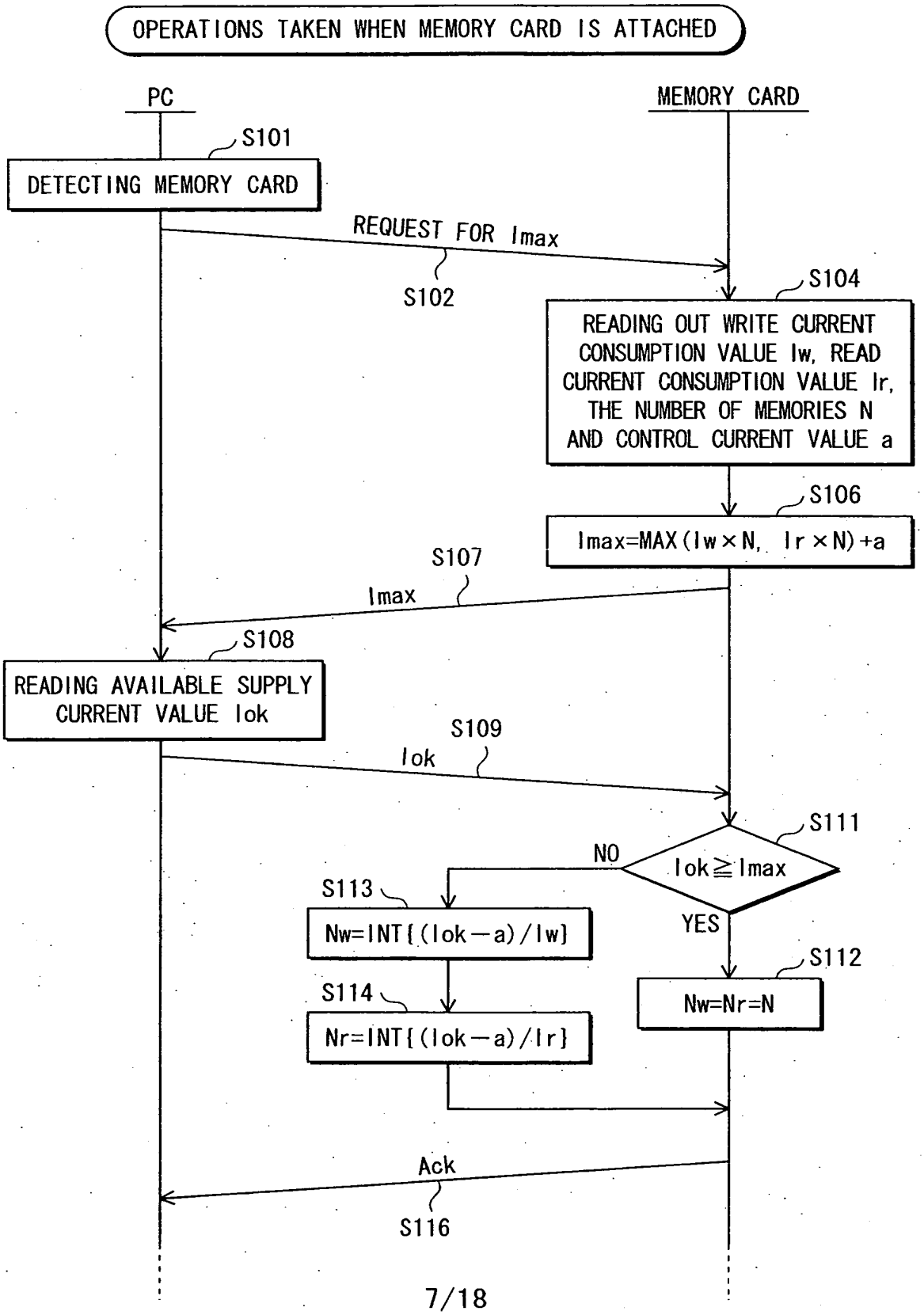

OPERATIONS TAKEN WHEN MEMORY CARD IS ATTACHED
PC
MEMORY CARD
S101
DETECTING MEMORY CARD
REQUEST FOR Imax
S102
S104
READING OUT WRITE CURRENT CONSUMPTION VALUE Iw, READ CURRENT CONSUMPTION VALUE Ir, THE NUMBER OF MEMORIES N AND CONTROL CURRENT VALUE a
S106
Imax=MAX(Iw×N, Ir×N)+a
S107
Imax
S108
READING AVAILABLE SUPPLY CURRENT VALUE Iok
S109
Iok
S111
NO
Iok≧Imax
YES
S113
Nw=INT[(Iok−a)/Iw]
S114
Nr=INT[(Iok−a)/Ir]
S112
Nw=Nr=N
Ack
S116

FIG. 8

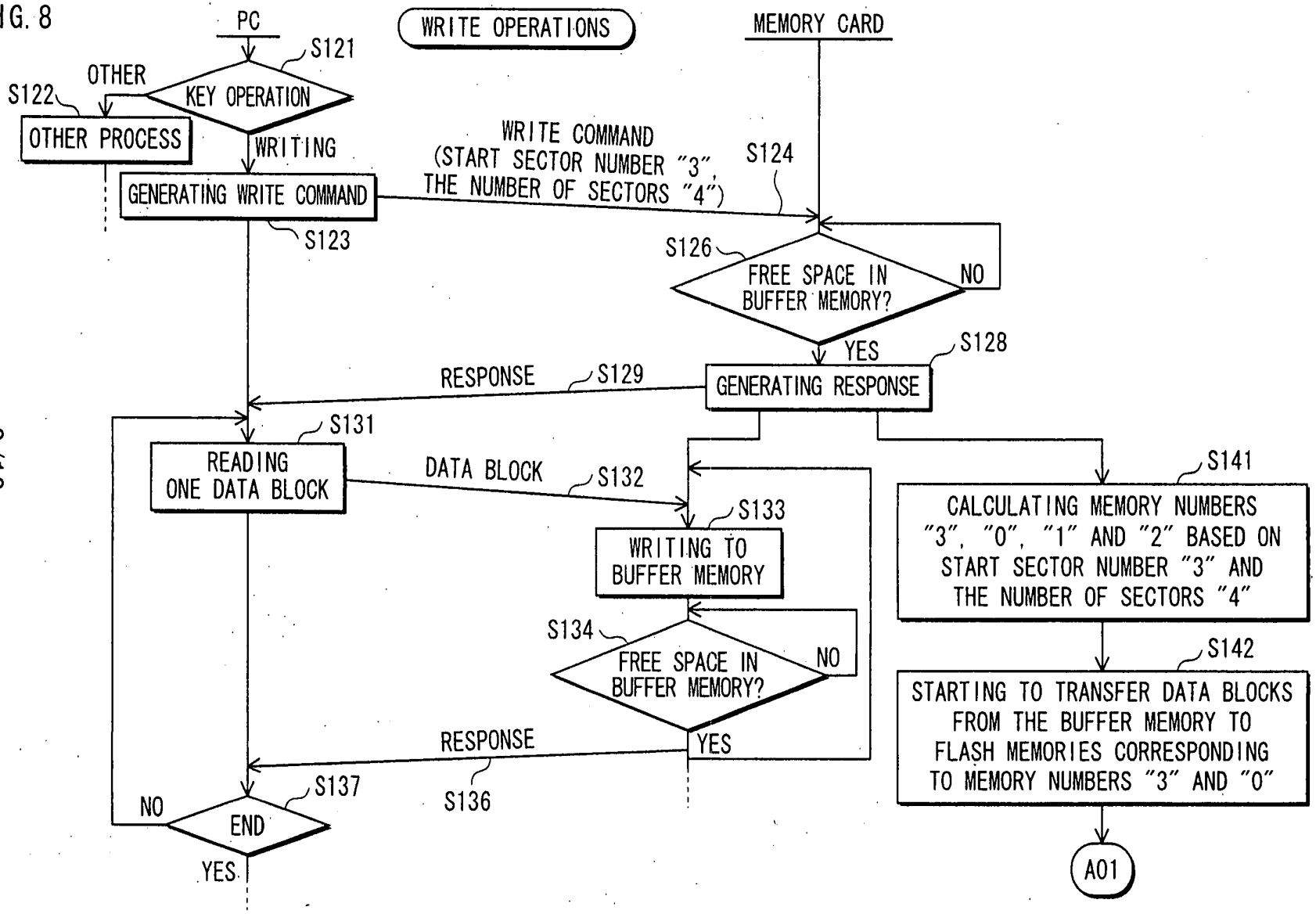

PC
WRITE OPERATIONS
MEMORY CARD
S121
KEY OPERATION
OTHER
S122
OTHER PROCESS
WRITING
GENERATING WRITE COMMAND
S123
WRITE COMMAND
(START SECTOR NUMBER "3",
THE NUMBER OF SECTORS "4")
S124
S126
FREE SPACE IN BUFFER MEMORY?
NO
YES
S128
GENERATING RESPONSE
RESPONSE
S129
S131
READING ONE DATA BLOCK
DATA BLOCK
S132
S133
WRITING TO BUFFER MEMORY
S134
FREE SPACE IN BUFFER MEMORY?
NO
YES
RESPONSE
S136
S137
NO
END
YES
S141
CALCULATING MEMORY NUMBERS "3", "0", "1" AND "2" BASED ON START SECTOR NUMBER "3" AND THE NUMBER OF SECTORS "4"
S142
STARTING TO TRANSFER DATA BLOCKS FROM THE BUFFER MEMORY TO FLASH MEMORIES CORRESPONDING TO MEMORY NUMBERS "3" AND "0"
A01

FIG. 9

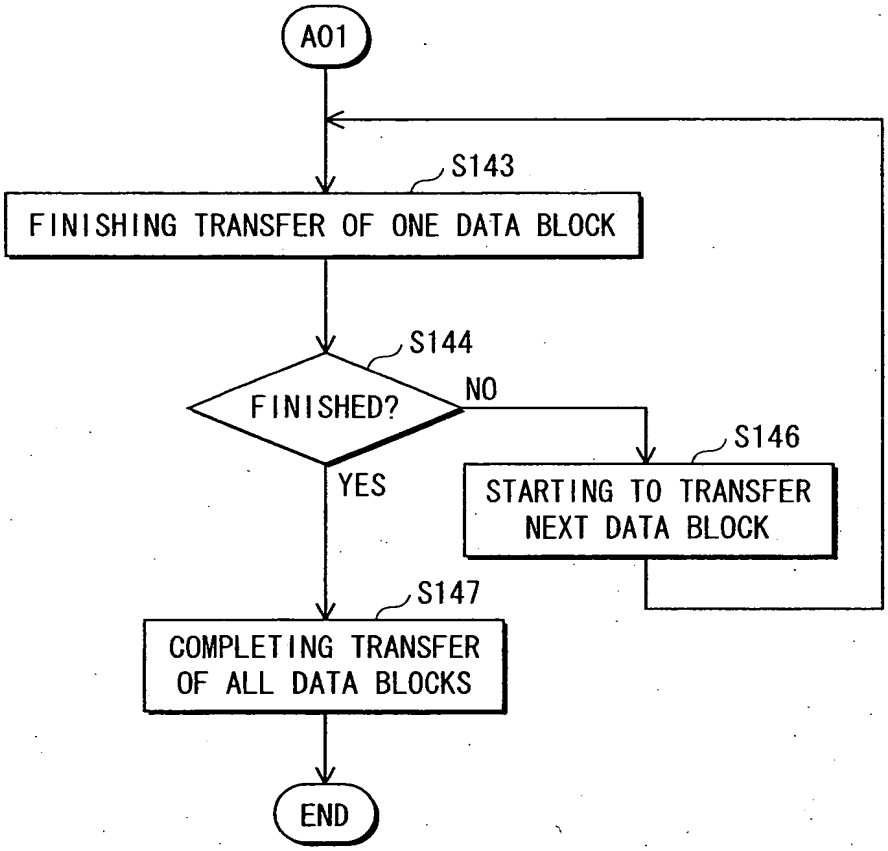

A01
S143
FINISHING TRANSFER OF ONE DATA BLOCK
S144
FINISHED?
NO
YES
S146
STARTING TO TRANSFER NEXT DATA BLOCK
S147
COMPLETING TRANSFER OF ALL DATA BLOCKS
END

FIG. 10

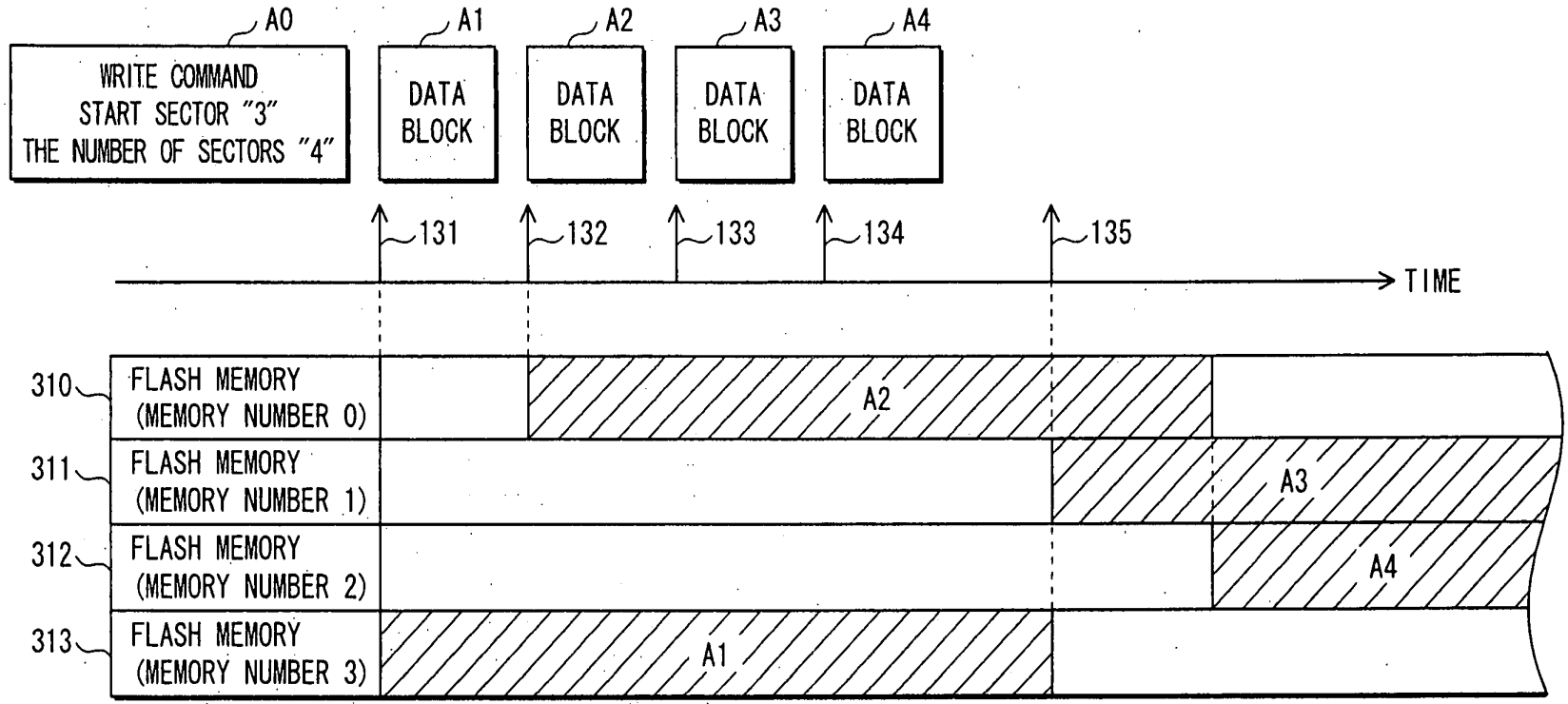

A0
A1
A2
A3
A4
WRITE COMMAND
START SECTOR "3"
THE NUMBER OF SECTORS "4"
DATA BLOCK
DATA BLOCK
DATA BLOCK
DATA BLOCK
131
132
133
134
135
TIME
310
FLASH MEMORY (MEMORY NUMBER 0)
A2
311
FLASH MEMORY (MEMORY NUMBER 1)
A3
312
FLASH MEMORY (MEMORY NUMBER 2)
A4
313
FLASH MEMORY (MEMORY NUMBER 3)
A1

FIG. 11

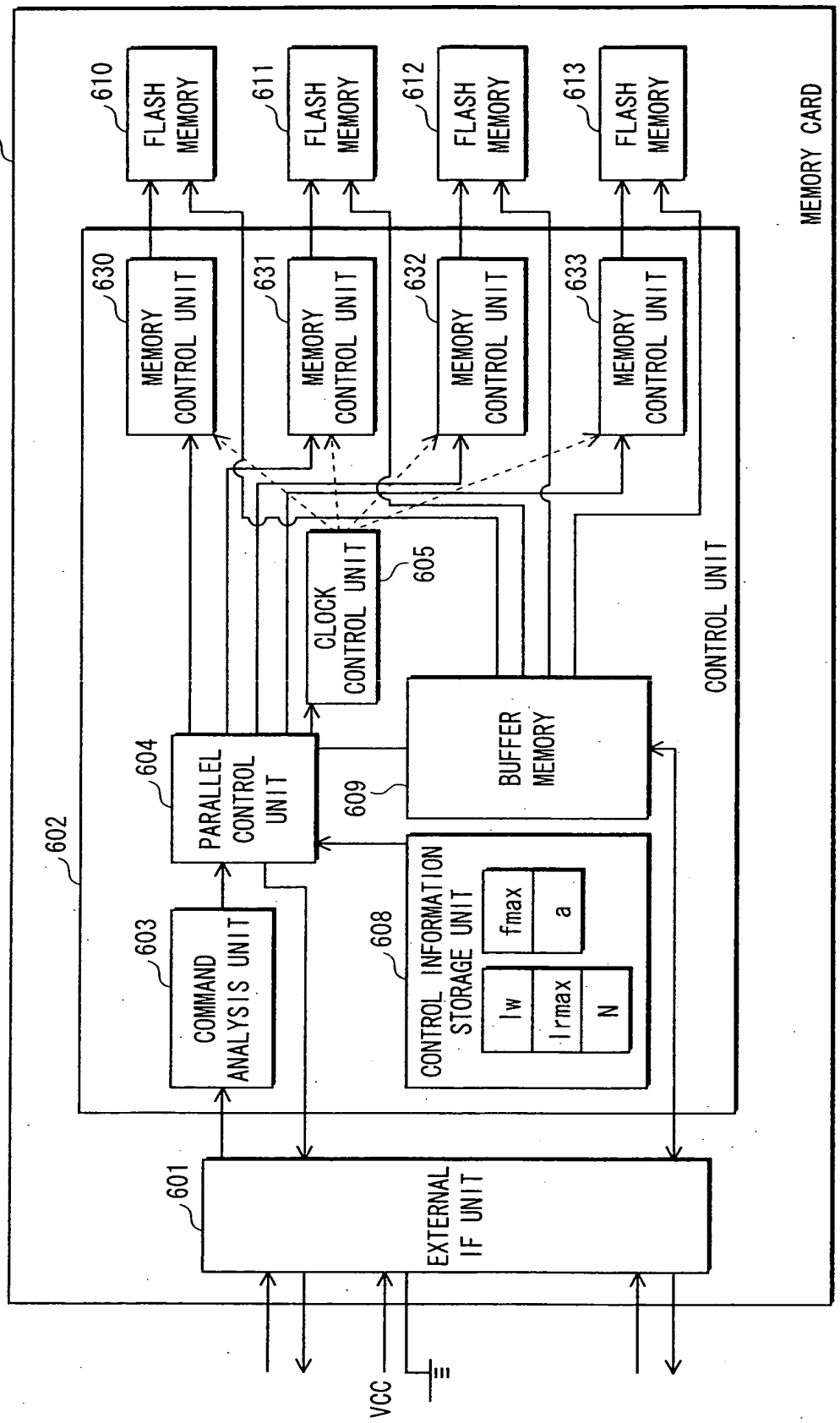

600
MEMORY CARD
610
FLASH MEMORY
611
FLASH MEMORY
612
FLASH MEMORY
613
FLASH MEMORY
630
MEMORY CONTROL UNIT
631
MEMORY CONTROL UNIT
632
MEMORY CONTROL UNIT
633
MEMORY CONTROL UNIT
605
CLOCK CONTROL UNIT
602
CONTROL UNIT
604
PARALLEL CONTROL UNIT
609
BUFFER MEMORY
603
COMMAND ANALYSIS UNIT
608
CONTROL INFORMATION STORAGE UNIT
fmax
a
Iw
Irmax
N
601
EXTERNAL IF UNIT
VCC

FIG. 12

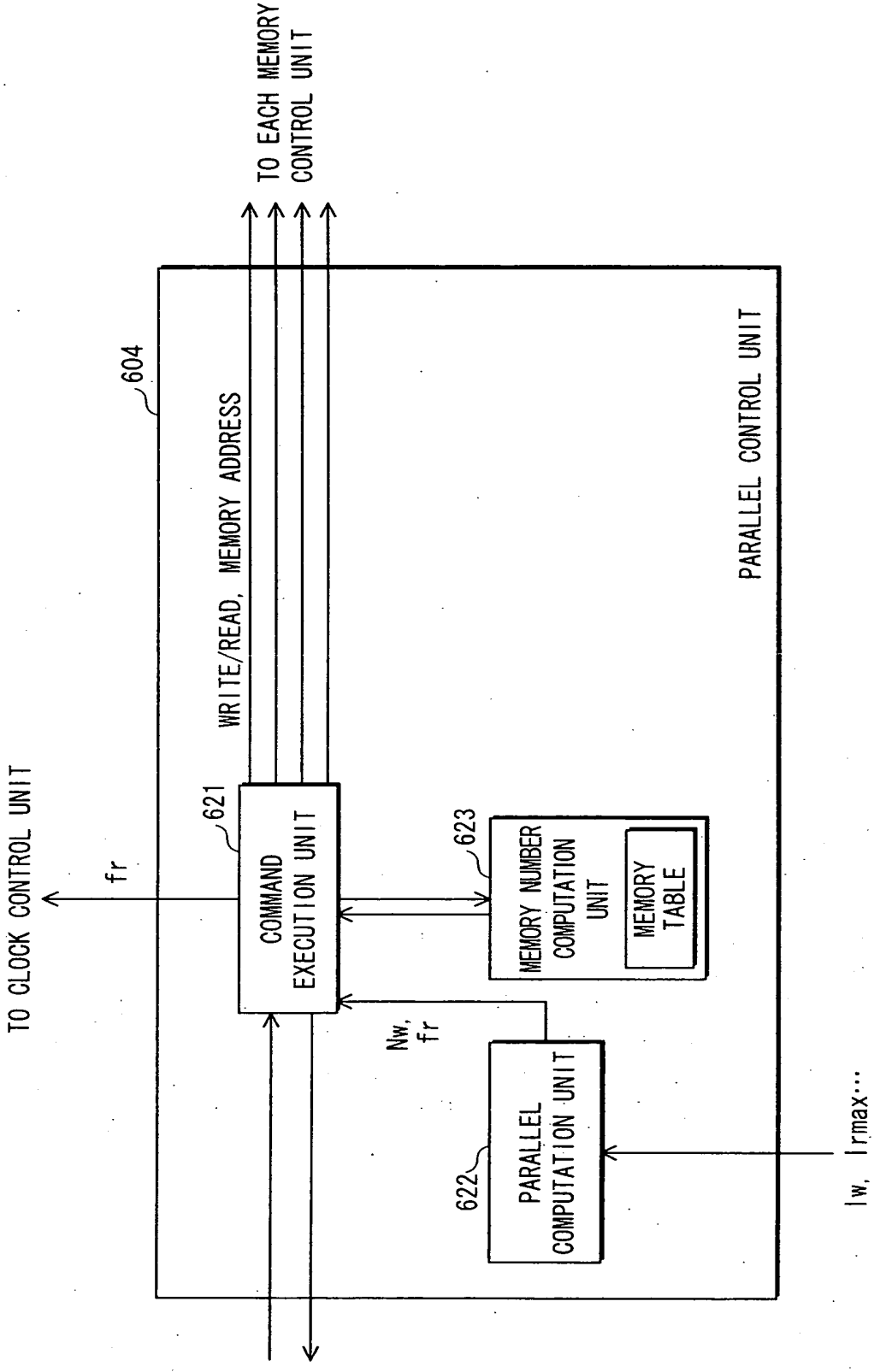

TO EACH MEMORY CONTROL UNIT
WRITE/READ, MEMORY ADDRESS
604
PARALLEL CONTROL UNIT
TO CLOCK CONTROL UNIT
fr
621
COMMAND EXECUTION UNIT
623
MEMORY NUMBER COMPUTATION UNIT
MEMORY TABLE
Nw, fr
622
PARALLEL COMPUTATION UNIT
Iw, Irmax…

FIG. 13

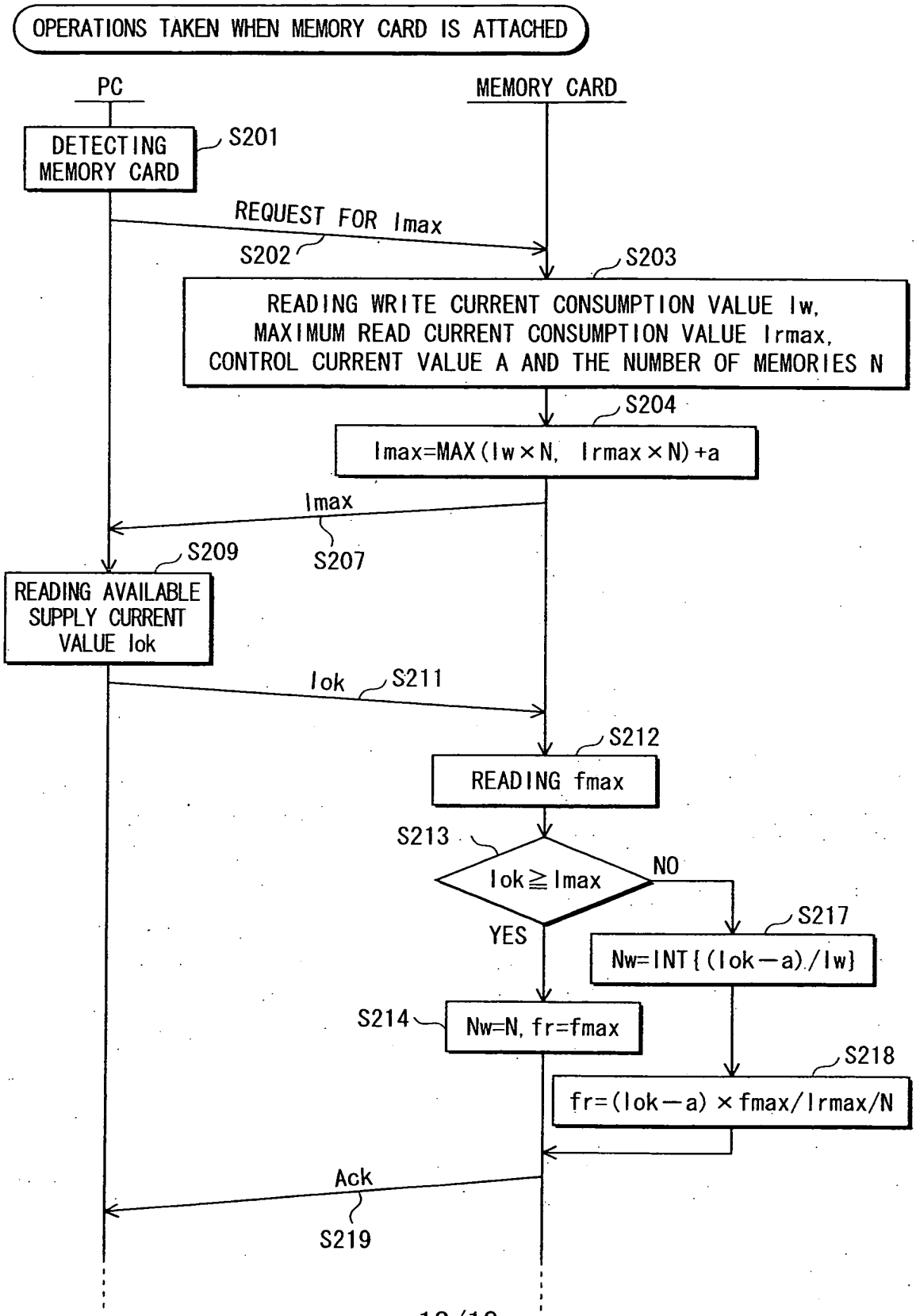

OPERATIONS TAKEN WHEN MEMORY CARD IS ATTACHED
PC
MEMORY CARD
DETECTING MEMORY CARD
S201
REQUEST FOR Imax
S202
S203
READING WRITE CURRENT CONSUMPTION VALUE Iw, MAXIMUM READ CURRENT CONSUMPTION VALUE Irmax, CONTROL CURRENT VALUE A AND THE NUMBER OF MEMORIES N
S204
Imax=MAX(Iw×N, Irmax×N)+a
Imax
S207
S209
READING AVAILABLE SUPPLY CURRENT VALUE Iok
Iok
S211
S212
READING fmax
S213
Iok≧Imax
NO
YES
S217
Nw=INT{(Iok−a)/Iw}
S214
Nw=N, fr=fmax
S218
fr=(Iok−a)×fmax/Irmax/N
Ack
S219

FIG. 14

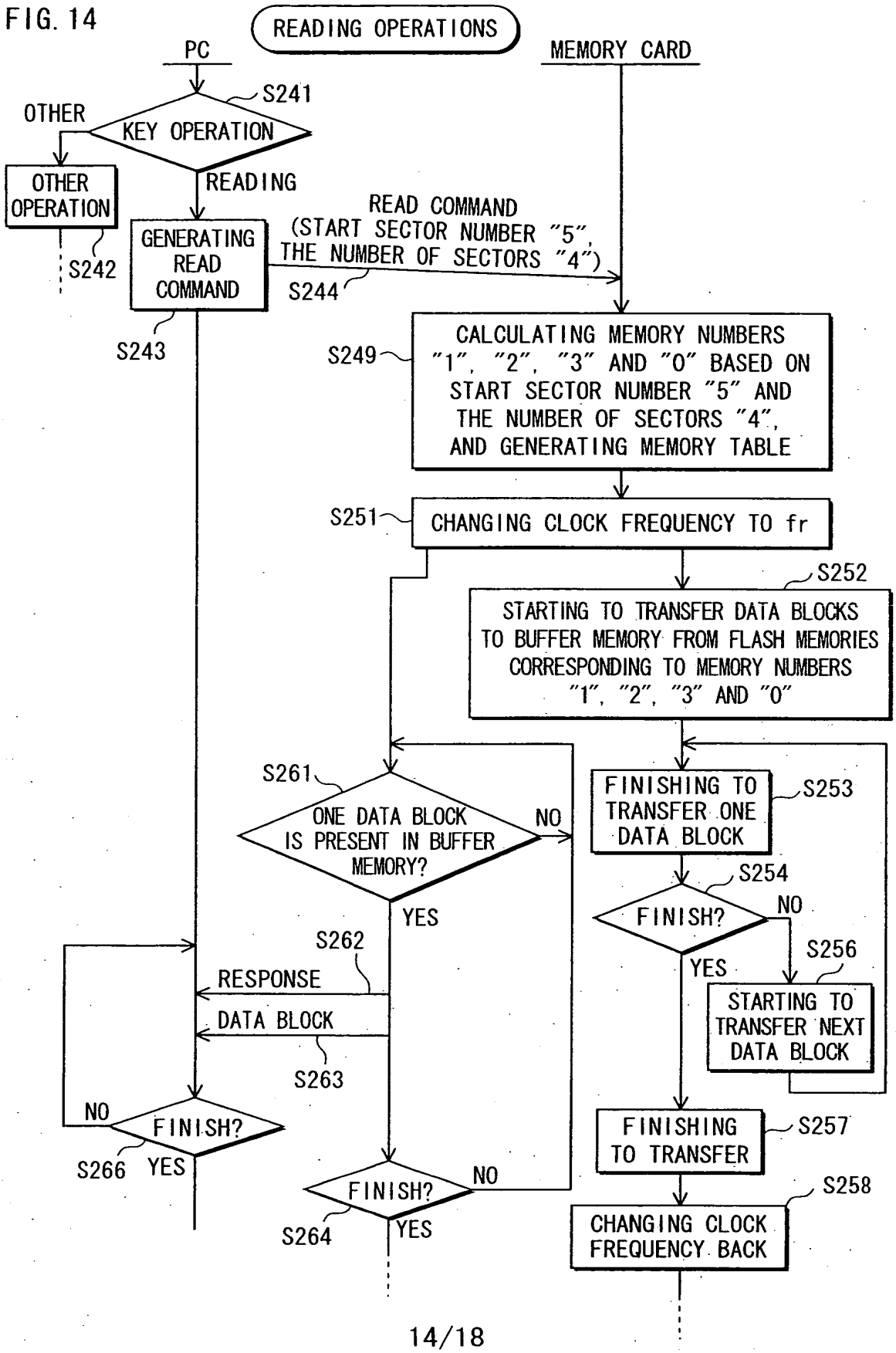

READING OPERATIONS
PC
MEMORY CARD
S241
KEY OPERATION
OTHER
READING
OTHER OPERATION
S242
GENERATING READ COMMAND
S243
READ COMMAND (START SECTOR NUMBER "5", THE NUMBER OF SECTORS "4")
S244
S249
CALCULATING MEMORY NUMBERS "1", "2", "3" AND "0" BASED ON START SECTOR NUMBER "5" AND THE NUMBER OF SECTORS "4", AND GENERATING MEMORY TABLE
S251
CHANGING CLOCK FREQUENCY TO fr
S252
STARTING TO TRANSFER DATA BLOCKS TO BUFFER MEMORY FROM FLASH MEMORIES CORRESPONDING TO MEMORY NUMBERS "1", "2", "3" AND "0"
S261
ONE DATA BLOCK IS PRESENT IN BUFFER MEMORY?
NO
YES
FINISHING TO TRANSFER ONE DATA BLOCK
S253
S254
FINISH?
NO
YES
S256
STARTING TO TRANSFER NEXT DATA BLOCK
S262
RESPONSE
DATA BLOCK
S263
NO
FINISH?
S266
YES
FINISH?
NO
S264
YES
FINISHING TO TRANSFER
S257
S258
CHANGING CLOCK FREQUENCY BACK

FIG. 15

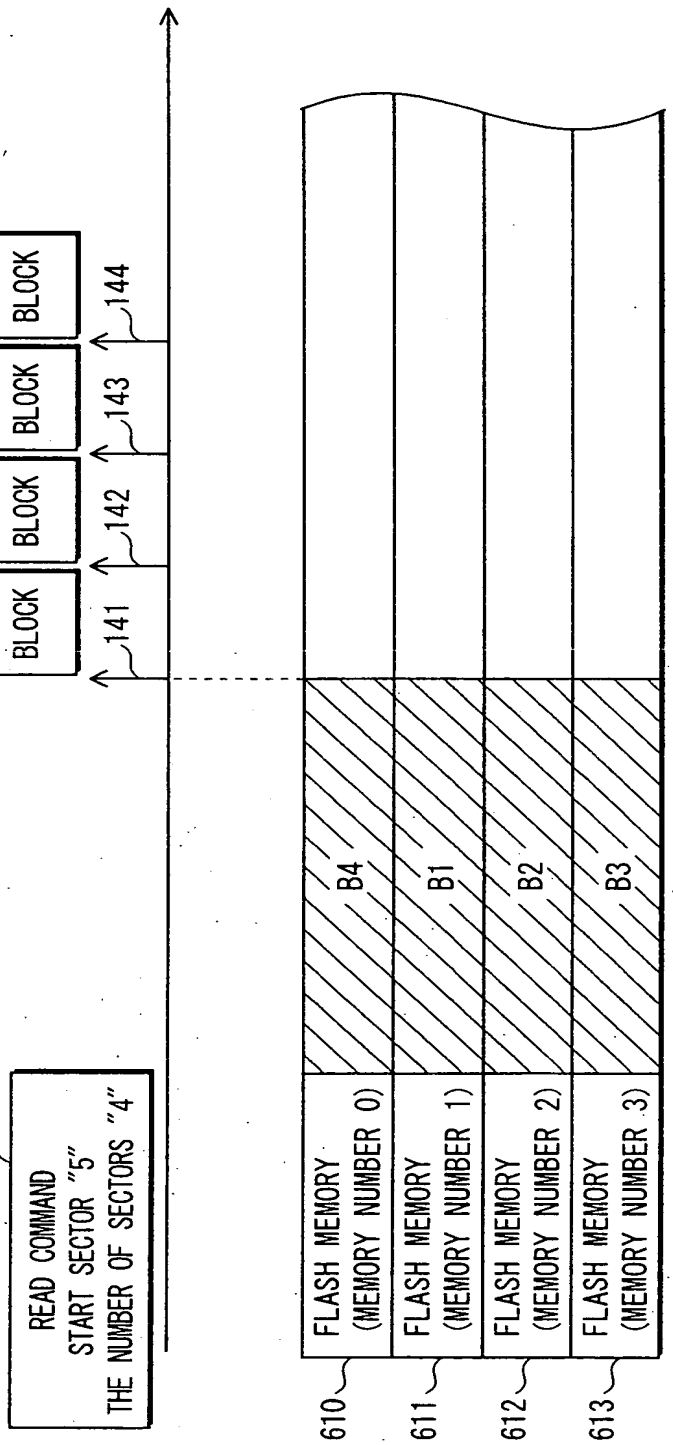

B0
READ COMMAND
START SECTOR "5"
THE NUMBER OF SECTORS "4"
B1
DATA BLOCK
B2
DATA BLOCK
B3
DATA BLOCK
B4
DATA BLOCK
141
142
143
144
610
611
612
613
FLASH MEMORY (MEMORY NUMBER 0)
FLASH MEMORY (MEMORY NUMBER 1)
FLASH MEMORY (MEMORY NUMBER 2)
FLASH MEMORY (MEMORY NUMBER 3)
B4
B1
B2
B3

FIG. 16

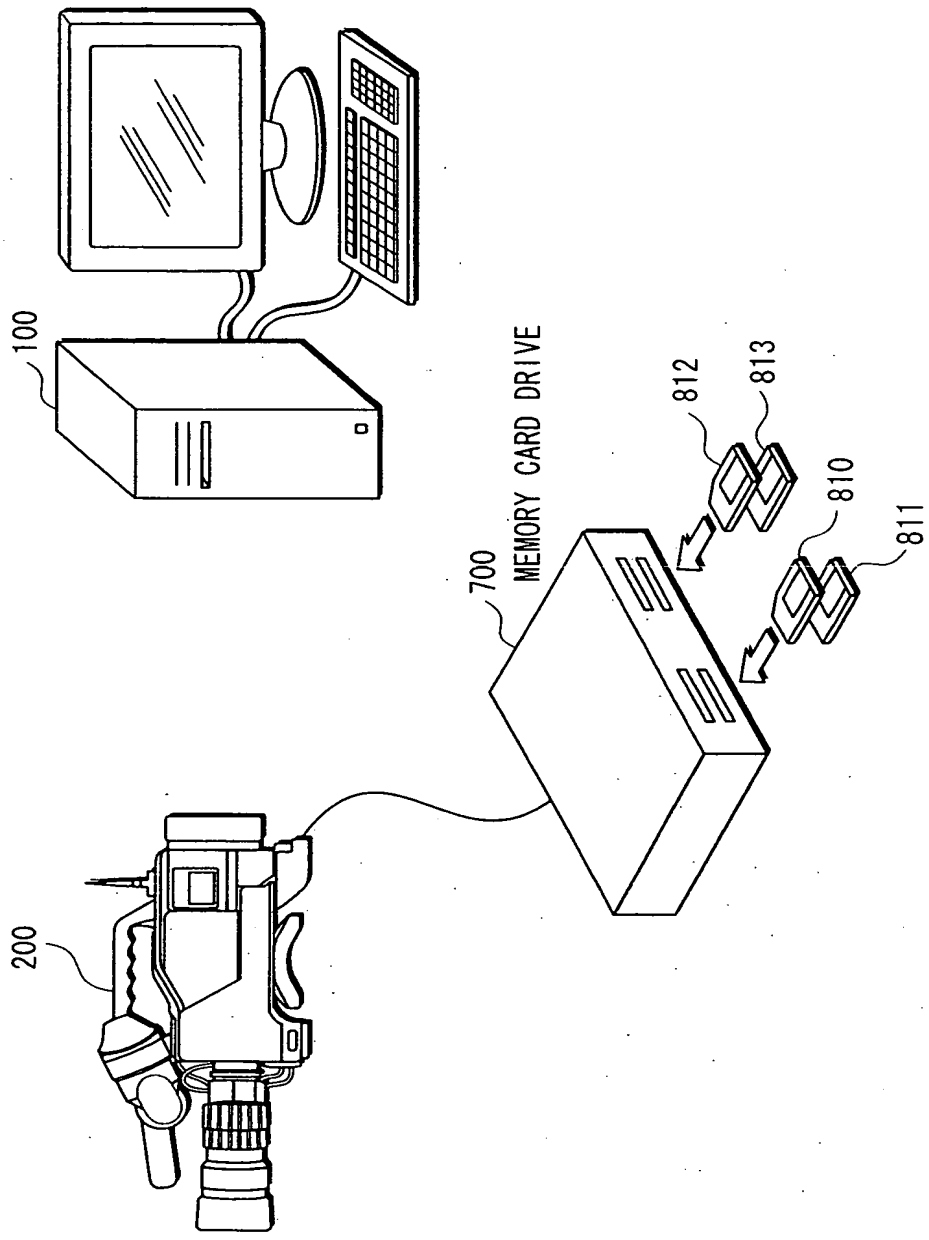


FIG. 17

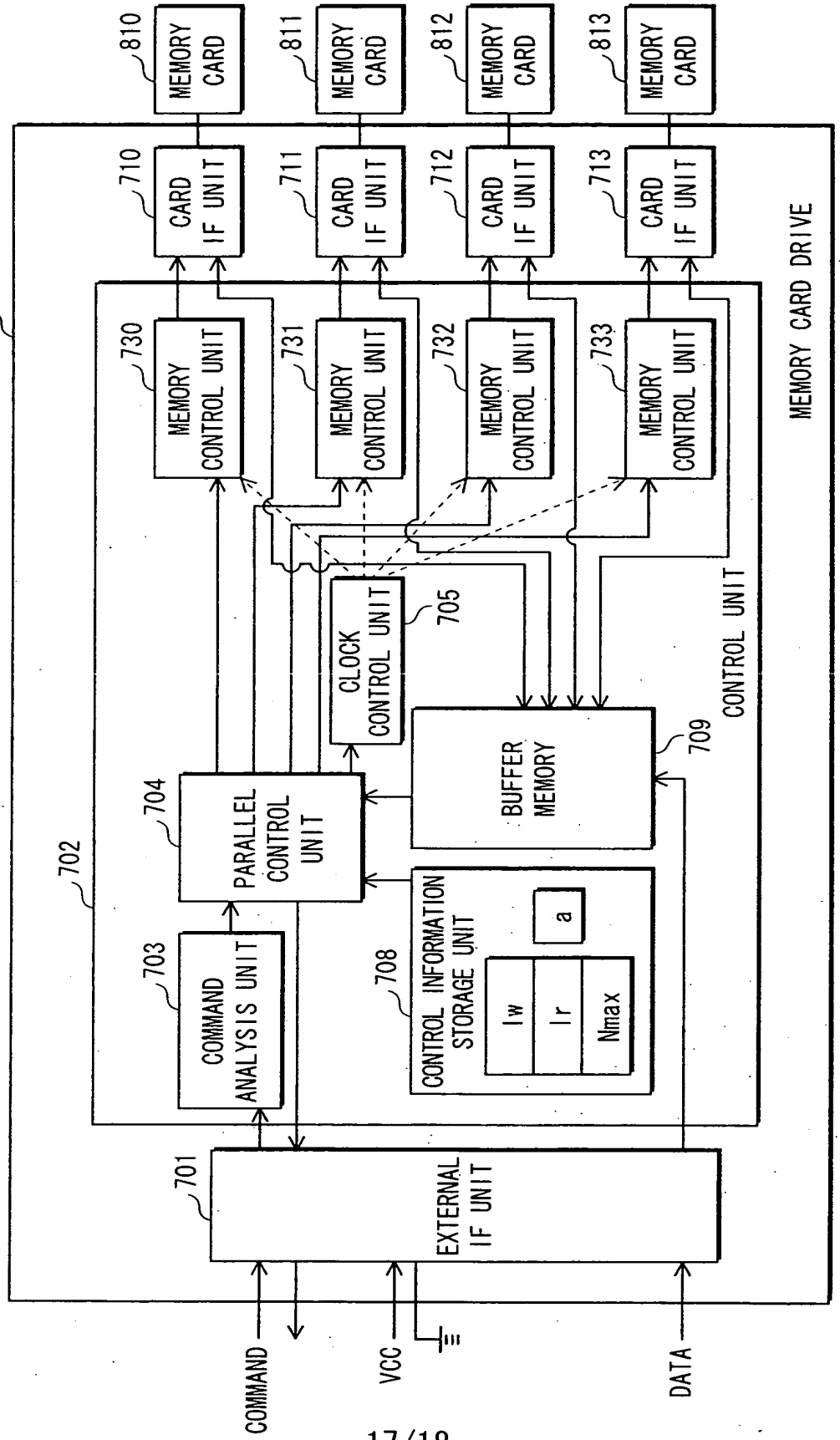
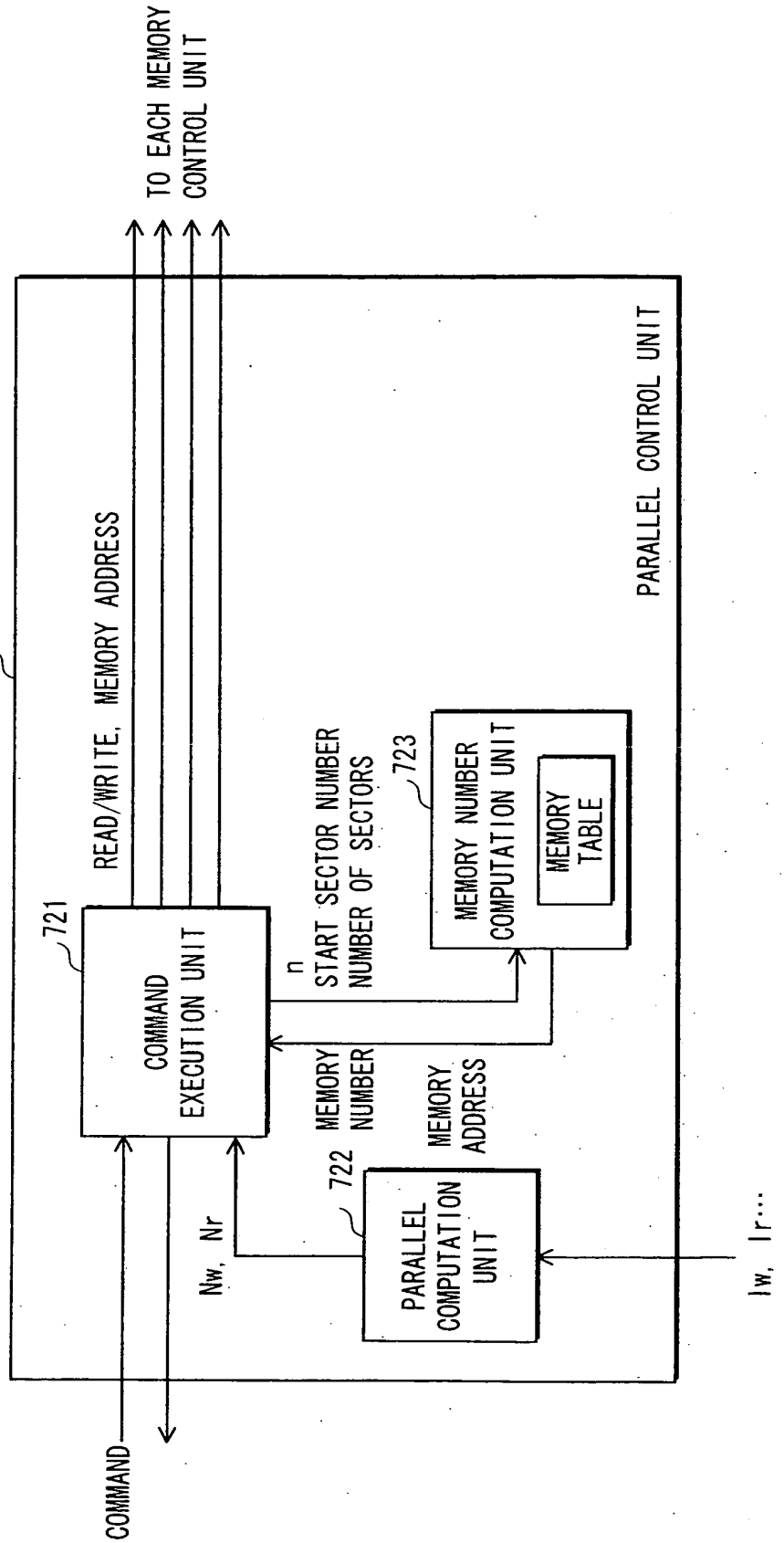

700
MEMORY CARD DRIVE
810
811
812
813
MEMORY CARD
710
711
712
713
CARD IF UNIT
730
731
732
733
MEMORY CONTROL UNIT
705
CLOCK CONTROL UNIT
709
BUFFER MEMORY
CONTROL UNIT
704
PARALLEL CONTROL UNIT
702
703
COMMAND ANALYSIS UNIT
708
CONTROL INFORMATION STORAGE UNIT
a
Iw
Ir
Nmax
701
EXTERNAL IF UNIT
COMMAND
VCC
DATA

FIG. 18


TO EACH MEMORY CONTROL UNIT
704
PARALLEL CONTROL UNIT
READ/WRITE, MEMORY ADDRESS
721
COMMAND EXECUTION UNIT
n
START SECTOR NUMBER
NUMBER OF SECTORS
723
MEMORY NUMBER COMPUTATION UNIT
MEMORY TABLE
MEMORY NUMBER
MEMORY ADDRESS
722
PARALLEL COMPUTATION UNIT
Nw, Nr
Iw, Ir...
COMMAND